CLAIMS

1. A composite laminated sandwich panel comprising:

N metal sheet layers comprising an aluminum non-heat treatable Al-Mg alloy having a magnesium content of from about 4% to about 6%, said N metal sheet layers being the same or different, and

N-1 polymer layers alternating in said sandwich panel with said metal sheet layers, wherein N is equal to at least 2, and each of said polymer layers comprises glass fibres.

2. A composite laminated sandwich panel according to claim 1, wherein N is at least 3.

3. A composite laminated sandwich panel according to claim 1, wherein said composite laminated sandwich panel includes two external faces, at least one of which comprises an aluminum non-heat treatable alloy sheet.

4. A composite laminated sandwich panel according to claim 1, wherein said aluminum non-heat treatable Al-Mg alloy is selected from the group consisting of 5082, 5083, 5182, 5086, 5383, 5456, and 5186 alloys.

5. A composite laminated sandwich panel according claim 1, wherein said Al-Mg alloy sheet comprises a 5182 or 5186 alloy in the H111 or H24 temper, and the thickness of said Al-Mg alloy sheet is between 0.2 and 0.4 mm.

6. A composite laminated sandwich panel according to claim 1, wherein the manganese content of the Al-Mg alloy is between 0.2 and 1%.

7. A composite laminated sandwich panel according to claim 6, wherein the scandium content of the Al-Mg alloy is between 0.1 and 0.3% and / or the hafnium content is between 0.2 and 0.4%.

8. A composite laminated sandwich panel according to claim 1, wherein the Al-Mg alloy further comprises at least one element forming dispersoids, said element being selected the group consisting of Zr, Cr, La, Ti, Ce, Nd, Eu, Gd, Tb, Dy, Ho, Er, Y and Yb.

9. A composite laminated sandwich panel according to claim 2, wherein the Al-Mg alloy further comprises at least one element forming dispersoids, said element being selected the group consisting of Zr, Cr, La, Ti, Ce, Nd, Eu, Gd, Tb, Dy, Ho, Er, Y and Yb.

10. A composite laminated sandwich panel according to claim 3, wherein the Al-Mg alloy further comprises at least one element forming dispersoids, said element being selected the group consisting of Zr, Cr, La, Ti, Ce, Nd, Eu, Gd, Tb, Dy, Ho, Er, Y and Yb.

11. A composite laminated sandwich panel according to claim 4, wherein the Al-Mg alloy further comprises at least one element forming dispersoids, said element being selected the group consisting of Zr, Cr, La, Ti, Ce, Nd, Eu, Gd, Tb, Dy, Ho, Er, Y and Yb.

12. A composite laminated sandwich panel according to claim 5, wherein the Al-Mg alloy further comprises at least one element forming dispersoids, said element being selected the group consisting of Zr, Cr, La, Ti, Ce, Nd, Eu, Gd, Tb, Dy, Ho, Er, Y and Yb.

13. A composite laminated sandwich panel according to claim 6, wherein the Al-Mg alloy further comprises at least one element forming dispersoids, said

element being selected the group consisting of Zr, Cr, La, Ti, Ce, Nd, Eu, Gd, Tb, Dy, Ho, Er, Y and Yb.

14. A composite laminated sandwich panel according to claim 7, wherein the Al-Mg alloy further comprises at least one element forming dispersoids, said element being selected the group consisting of Zr, Cr, La, Ti, Ce, Nd, Eu, Gd, Tb, Dy, Ho, Er, Y and Yb.

15. A composite laminated sandwich panel according to claim 1, wherein said metal sheet has a tensile yield strength of at least about 240 MPa, and an ultimate tensile strength of at least about 260 MPa.

16. A composite laminated sandwich panel according to claim 15, wherein said tensile yield strength is at least 260 MPa and an ultimate tensile strength of at least about 275 MPa.

17. A composite laminated sandwich panel according to claim 7, wherein said metal sheet has a tensile yield strength of at least about 300 MPa .

18. A composite laminated sandwich panel according to claim 7, wherein said metal sheet has a tensile yield strength of at least about 330 MPa.

19. A composite laminated sandwich panel according to claim 15, wherein said metal sheet has an apparent stress intensity factor equal to K_{CO}, measured according to the ASTM E 561 standard on a 400 mm wide panel with an initial crack of 133 mm, equal to at least about 75 MPa$\sqrt{m}$,

20. A panel according to claim 19 wherein the apparent stress intensity factor is at least 80 MPa$\sqrt{m}$.

21. A panel according to claim 19, wherein the apparent stress intensity factor is at least about 85 MPa$\sqrt{m}$.

22. A structural element comprising a composite laminated sandwich panel according to claim 1.

23. A structural element comprising a composite laminated sandwich panel according to claim 2.

24. A structural element comprising a composite laminated sandwich panel according to claim 3.

25. A structural element comprising a composite laminated sandwich panel according to claim 4.

26. A structural element comprising a composite laminated sandwich panel according to claim 5.

27. A structural element comprising a composite laminated sandwich panel according to claim 6.

28. A structural element comprising a composite laminated sandwich panel according to claim 7.

29. A structural element comprising a composite laminated sandwich panel according to claim 8.

30. A structural element comprising a composite laminated sandwich panel according to claim 9.

31. A structural element comprising a composite laminated sandwich panel according to claim 10.

32. A structural element comprising a composite laminated sandwich panel according to claim 11.

33. A structural element comprising a composite laminated sandwich panel according to claim 12.

34. A structural element comprising a composite laminated sandwich panel according to claim 13.

35. A structural element comprising a composite laminated sandwich panel according to claim 14.

36. A structural element comprising a composite laminated sandwich panel according to claim 15.

37. A structural element comprising a composite laminated sandwich panel according to claim 16.

38. A structural element comprising a composite laminated sandwich panel according to claim 17.

39. A structural element comprising a composite laminated sandwich panel according to claim 18.

40. A structural element comprising a composite laminated sandwich panel according to claim 19.

41. A structural element comprising a composite laminated sandwich panel according to claim 20.

42. A structural element comprising a composite laminated sandwich panel according to claim 21.

43. A structural element as claimed in claim 22, wherein said structural element is suitable or otherwise used in aeronautical construction.

44. A structural element as claimed in claim 23, wherein said structural element is suitable or otherwise used in aeronautical construction.

45. A structural element as claimed in claim 24, wherein said structural element is suitable or otherwise used in aeronautical construction.

46. A structural element as claimed in claim 25, wherein said structural element is suitable or otherwise used in aeronautical construction.

47. A structural element as claimed in claim 26, wherein said structural element is suitable or otherwise used in aeronautical construction.

48. A structural element as claimed in claim 27, wherein said structural element is suitable or otherwise used in aeronautical construction.

49. A structural element as claimed in claim 28, wherein said structural element is suitable or otherwise used in aeronautical construction.

50. A structural element as claimed in claim 29, wherein said structural element is suitable or otherwise used in aeronautical construction.

51. A structural element as claimed in claim 30, wherein said structural element is suitable or otherwise used in aeronautical construction.

52. A structural element as claimed in claim 31, wherein said structural element is suitable or otherwise used in aeronautical construction.

53. A structural element as claimed in claim 32, wherein said structural element is suitable or otherwise used in aeronautical construction.

54. A structural element as claimed in claim 33, wherein said structural element is suitable or otherwise used in aeronautical construction.

55. A structural element as claimed in claim 34, wherein said structural element is suitable or otherwise used in aeronautical construction.

56. A structural element as claimed in claim 35, wherein said structural element is suitable or otherwise used in aeronautical construction.

57. A structural element as claimed in claim 36, wherein said structural element is suitable or otherwise used in aeronautical construction.

58. A structural element as claimed in claim 37, wherein said structural element is suitable or otherwise used in aeronautical construction.

59. A structural element as claimed in claim 38, wherein said structural element is suitable or otherwise used in aeronautical construction.

60. A structural element as claimed in claim 39, wherein said structural element is suitable or otherwise used in aeronautical construction.

61. A structural element as claimed in claim 40, wherein said structural element is suitable or otherwise used in aeronautical construction.

62. A structural element as claimed in claim 41, wherein said structural element is suitable or otherwise used in aeronautical construction.

63. A structural element as claimed in claim 42, wherein said structural element is suitable or otherwise used in aeronautical construction.

64. An aircraft fuselage component comprising a composite laminate sandwich panel according to claim 1.

65. An aircraft door component comprising at least one composite laminate sandwich panel according to claim 1.

66. A composite laminated sandwich panel comprising:

at least two external faces, at least one of which comprises an aluminum non-heat treatable alloy sheet, a first of said external faces comprising a metal sheet layer comprising an aluminum non-heat treatable Al-Mg alloy having a magnesium content of from about 4% to about 6%, a second of said external faces comprising a heat-treatable or non-heat-treatable alloy, and

an adhesive layer between said two faces.

67. A structural element comprising at least one panel according to claim 66.

68. A structural element according to claim 67, comprising an aeronautical construction.

69. A structural element according to claim 68, wherein said aeronautical construction comprises an aircraft fuselage element or an aircraft door.

70. A panel according to claim 66, wherein said adhesive comprises a polymer.

71. A panel according to claim 70, wherein said polymer comprises an epoxy.

72. A panel according to claim 66 comprising at least 5 layers, 3 layers comprising metal sheets and 2 layers comprising an adhesive.

73. A panel according to claim 72, wherein said adhesive comprises a thermosetting polymer.

74. A panel according to claim 66, wherein the thickness of said sheets in composite laminated sandwich panels is less than about 1 mm.

75. A panel according to claim 74, wherein the thickness is less than about 0.6 mm.

76. A panel according to claim 75, wherein the thickness is less than 0.2 mm.

77. An aluminum composite comprising at least one non-heat-treatable Al-Mg alloy having an ultimate tensile strength and a tensile yield strength products that is within 12% of the mechanical properties of a Glare-type composite laminated sandwich panels incorporating 2024 T3.

78. An aluminum composite according to claim 77, wherein said composite is obtained without using metal sheets that have been subjected to structural hardening, and / or without using clad sheets.

79. A structural element comprising an aluminum composite according to claim 77.

80. A composite laminated sandwich panel according to claim 8, wherein the total concentration of said dispersoids does not exceed about 2% and the concentration of each individual dispersoid element does not exceed about 0.5%.